

What is claimed is:

1. An impeller for use in a mixing vessel having a diameter, wherein the impeller is mountable onto a rotatable shaft that has an outer diameter and a flange, comprising:

a unitary blade pair member having a width  $W$  and a diameter  $D$  comprising:

a central hub portion having a centerline and an inner diameter at least as large as the outer diameter of the shaft;

a first blade radially extending from said central hub portion, said first blade having a first generally planar portion, a first tip portion and a first trailing edge, wherein said first generally planar portion and said first tip portion are at an angle to each other and intersect along a first line of intersection which first line of intersection does not pass through the centerline of said central axis;

a second blade radially extending from said central hub portion, said second blade having a second generally planar portion, a second tip portion and a second trailing edge, wherein said second generally planar portion and said second tip portion are at an angle to each other and intersect along a second line of intersection which second line of intersection does not pass through the centerline of said central axis.

2. The impeller according to claim 1, wherein said first tip portion is generally triangular and said second tip portion is generally triangular.

3. An impeller for use in a mixing vessel having a diameter, wherein the impeller is mountable onto a rotatable shaft that has an outer diameter and a flange, comprising:

a blade pair member having a width W and a diameter D comprising:

a central hub portion having an inner diameter at least as large as the outer diameter of the shaft;

a first blade connected to said central hub portion, said first blade having a first generally planar portion, a first tip portion and a first trailing edge, wherein said first generally planar portion and said first tip portion intersect at a first line of intersection, and wherein said first tip portion is oriented so that said first line of intersection has a first angle relative to said trailing edge between approximately 15 degrees to approximately 35 degrees;

a second blade connected to said central hub portion, said second blade having a second generally planar portion, a second tip portion and a second trailing edge, wherein said second generally planar portion and said second tip portion intersect at a second line of intersection, and wherein said second tip portion is oriented so that said second line of intersection has a second angle relative to said trailing edge between approximately 15 degrees to approximately 35 degrees.

4. The impeller according to claim 3, wherein said first angle is equal to approximately 28 degrees and said second angle is equal to approximately 28 degrees.

5. The impeller according to claim 3, wherein said first tip portion further comprises a first outer edge and wherein said first outer edge is oriented at an angle to said first generally planar portion equal to approximately 20 degrees to approximately 40 degrees, and

wherein said second tip portion further comprises a second outer edge and wherein said second outer edge is oriented at an angle to said second generally planar portion equal to approximately 20 degrees to approximately 40 degrees.

6. The impeller according to claim 5, wherein said first outer edge is oriented at an angle equal to approximately 25 degrees and said second outer edge is oriented at an angle equal to approximately 25 degrees.

7. The impeller according to claim 3, wherein the diameter D of said blade pair is equal to approximately 35% to approximately 75% of the mixing vessel diameter.

8. The impeller according to claim 7, wherein the diameter D of said blade pair is equal to approximately 45% to approximately 65% of the mixing vessel diameter.

9. The impeller according to claim 7, wherein said width W of said blade pair is equal to approximately 15% to approximately 25% of the diameter D.

10. The impeller according to claim 9, wherein said width  $W$  of said blade pair is equal to approximately 21% of the diameter  $D$ .

11. The impeller according to claim 3, further comprising:  
a plurality of mounting holes disposed on said central hub portion; and  
a plurality of bolts that fasten said blade pair member to the flange via said mounting holes.

12. The impeller according to claim 11, further comprising a clamp member having a plurality of corresponding holes that correspond with said mounting holes, wherein said bolts extend through said corresponding holes and said mounting holes to attach said blade member to the flange.

13. The impeller according to claim 3, wherein said blade pair member is attached to the flange via welded attachment.

14. The impeller according to claim 3, wherein said blade pair member further comprises a frictional fit key member that said first blade and said second blade attach thereto,

wherein said frictional fit key member is releasably connected at a location along the length of the shaft via frictional fit.

15. An impeller for use in a mixing vessel having a diameter, wherein the impeller is mountable onto a rotatable shaft that has an outer diameter and a flange, comprising:

a blade pair member having a width W and a diameter D comprising:

a central hub portion having an inner diameter at least as large as the outer diameter of the shaft;

a first blade connected to said central hub portion, said first blade having a first generally planar portion, a first tip portion and a first outer edge, wherein said first outer edge is oriented at an angle to said first generally planar portion equal to approximately 20 degrees to approximately 40 degrees;

a second blade connected to said central hub portion, said second blade having a second generally planar portion, a second tip portion and a second outer edge, wherein said second outer edge is oriented at an angle to said second generally planar portion equal to approximately 20 degrees to approximately 40 degrees.

16. The impeller according to claim 15, wherein said first blade further comprises a first trailing edge and wherein said first generally planar portion and said first tip portion intersect at a first line of intersection, and wherein said first tip portion is oriented so that said first line of intersection has an angle relative to said trailing edge equal to approximately 15 degrees to approximately 35 degrees, and

wherein said second blade further comprises a second trailing edge, and wherein said second generally planar portion and said second tip portion intersect

at a second line of intersection, and wherein said second tip portion is oriented so that said second line of intersection has an angle relative to said trailing edge equal to approximately 15 degrees to approximately 35 degrees.

17. The impeller according to claim 15, wherein said first outer edge is oriented at an angle equal to approximately 25 degrees and said second outer edge is oriented at an angle equal to approximately 25 degrees.

18. The impeller according to claim 16, wherein said each of said line of intersection angle is equal to approximately 28 degrees.

19. The impeller according to claim 15, wherein the diameter D of said blade pair is equal to approximately 35% to approximately 75% of the mixing vessel diameter.

20. The impeller according to claim 19, wherein the diameter D of said blade pair is equal to approximately 45% to approximately 65% of the mixing vessel diameter.

21. The impeller according to claim 19, wherein said width W of said blade pair is equal to approximately 15% to approximately 25% of the diameter D.

22. The impeller according to claim 21, wherein said width W of said blade pair is equal to approximately 21% of the diameter D.

23. The impeller according to claim 15, further comprising:  
a plurality of mounting holes disposed on said central hub portion; and  
a plurality of bolts that fasten said one blade pair member to the flange via said mounting holes.

24. The impeller according to claim 23, further comprising a clamp member having a plurality of corresponding holes that correspond with said mounting holes, wherein said bolts extend through said corresponding holes and said mounting holes to attach said one blade member to the flange.

25. A method for mixing or blending materials, comprising mixing or agitating materials using an impeller comprising a blade pair member having a width W and a diameter D, the impeller further comprises a central hub portion having an inner diameter at least as large as the outer diameter of the shaft; a first blade connected to said central hub portion, said first blade having a first generally planar portion, a first tip portion and a first trailing edge, wherein said first generally planar portion and said first tip portion intersect at a first line of intersection, and wherein said first tip portion is oriented so that said first line of intersection has a first angle relative to said trailing edge between approximately 15 degrees to approximately 35 degrees; a second blade connected to said central hub portion, said second blade having a second generally planar portion, a second

tip portion and a second trailing edge, wherein said second generally planar portion and said second tip portion intersect at a second line of intersection, and wherein said second tip portion is oriented so that said second line of intersection has a second angle relative to said trailing edge between approximately 15 degrees to approximately 35 degrees.